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DOCUMENT-IDENTIFIER: US 4855276 A

TITLE: Solid filtration medium incorporating alumina and carbon

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INVENTOR-INFORMATION:

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CODE COUNTRY			
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FIELD-OF-SEARCH: 502/415; 502/416 ; 502/417

REF-CITED:

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ART-UNIT: 116

PRIMARY-EXAMINER: Konopka; Paul E.

#### ABSTRACT:

An adsorbent composition, method of preparing same, and  
method of treating a  
fluid stream with the absorbent are disclosed. Alumina and  
carbon are combined  
with water in preferred proportions in one embodiment.  
Sodium bicarbonate and  
impregnates such as Group 1A metal hydroxides and Group 7A

salts of Group 1A  
metals can be added. Improved efficiency of removal of  
compounds such as  
hydrogen sulfide is achieved, and ignition temperature is  
reduced.

15 Claims, 0 Drawing figures

Exemplary Claim Number: 1

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Brief Summary Text - BSTX:

Chlorine (Cl.sub.2) is a greenish-yellow gas with a  
suffocating odor. The  
compound is used for bleaching fabrics, purifying water,  
treating iron, and  
other uses. Control of this powerful irritant is most  
desirable for the  
well-being of those who work with it or are otherwise  
exposed to it. At lower  
levels, in combination with moisture, chlorine has a  
corrosive effect on  
electronic circuitry, stainless steel and the like.

Brief Summary Text - BSTX:

See also, for example, French Patent No. 1,388,453, which  
describes activated  
carbon granules impregnated with 1% iodine (I.sub.2) for  
this use. South  
African Patent No. 70/4611 discloses the use of  
silicate-impregnated activated  
carbon. Swinarski et al, Chem. Stosowana, Ser. A 9(3),  
287-94(1965),  
(Chemical Abstracts, Vol. 64, 1379c), describe the use of  
activated carbon  
treated with potassium salts, including potassium hydroxide  
(KOH) for hydrogen  
sulfide adsorption. Activated carbon has also been  
impregnated with a solution  
of sodium hydroxide (NaOH) and potassium iodide (KI).

Brief Summary Text - BSTX:

Other uses of impregnated carbon include removing water from air (dessication), see, for example, Soviet Union Patent No. 1,219,122 (activated carbon combined with aluminum oxide; a binder, calcium hydroxide; and lithium bromide); and the removal of acidic contaminants from gas streams, see, for example, U.S. Pat. No. 4,215,096 (activated carbon impregnated with sodium hydroxide and moisture, for the removal of chlorine from gas streams) and U.S. Pat. No. 4,273,751 (activated carbon impregnated with sodium hydroxide and moisture, for the removal of sulfur oxide gases and vapors from gas streams).

Brief Summary Text - BSTX:

The new filtration media embodying the present invention provide improved efficiency in removing H.sub.2 S from gas streams. At some levels of removal efficiency ("breakthrough efficiency"), pellets embodying the invention will last over 90% longer than activated carbon impregnated with sodium hydroxide, and will provide better removal efficiency. Filtration media embodying the invention are also capable of removing chlorine gas and hydrocarbons from gas streams.

Brief Summary Text - BSTX:

The adsorbent composition of the present invention is appropriately used alone in beds for the removal of undesirable compounds. It is also appropriate, however, to use the composition of the present invention in conjunction with beds containing other adsorbents. Such combination is especially appropriate when high levels of chlorine or hydrocarbons are present in the gas stream.

Any such bed may be placed either upstream (before the adsorbent of the present invention with respect to the effluent gas being treated) or downstream.

Detailed Description Text - DETX:

A dry feed mix is prepared of 33% by weight activated alumina DD290, having a loss on ignition factor (LOI) of 6.0; 33% by weight of activated carbon powder 280C, having a surface area in excess of 1000 square meters per gram and passing through a 325 mesh screen; and 33% sodium bicarbonate. The dry feed mix is mixed in a tumbling mill with a 20% aqueous solution of sodium thiosulfate ( $\text{Na}_2\text{S}_2\text{O}_3$ ) sprayed at room temperature onto the dry feed mix while tumbling, in the manner described in U.S. Pat. No. 3,226,332. The resulting pellets are cured in air at 140 °F. for 24 hours, and contain by weight 10%  $\text{Na}_2\text{S}_2\text{O}_3$  and 10% water. The cured pellets are suitable for placement in filter beds for the adsorption of undesirable compounds, particularly chlorine.

Detailed Description Text - DETX:

A study is carried out to evaluate the removal efficiency of the adsorbent composition of the present invention for chlorine gas ( $\text{Cl}_2$ ). A dry feed mix is prepared and impregnated as in Example 2. Curing is as in Example 1. The resulting pellets are screened to 4 times 6 mesh and contain about 10% by weight of moisture, 5% of KOH, and 5% of KI.

Detailed Description Text - DETX:

The testing is carried out in a continuous flow system as described in Example

2. The sample charge weight is 27.5 grams. A test column containing IVP (charge weight 26.61) is simultaneously tested under the same conditions. Chlorine gas of molecular weight 70.91 is passed through each sample bed at a bed velocity of 75 ft/min and an airflow volume rate of 12,100 milliliters per minute. The residence time of the gas is 0.2 seconds. The Cl.sub.2 content of the inlet and outlet gas streams is measured using a colorimetric analyzer. All samples are tested under ambient conditions. The results of these evaluations are summarized in Table 8 below.

#### Detailed Description Text - DETX:

A study is carried out to evaluate the removal efficiency of the adsorbent composition of the present invention for chlorine in a liquid solution. A dry feed mix is prepared by combining, by weight, 5% activated alumina, 50% activated carbon powder, and 45% sodium bicarbonate. Water is added while the dry feed mix is being tumbled in a tumble mill. The activated alumina is known as DD290, having a loss on ignition factor (LOI) of 6.0. The activated carbon powder is known as 207C, having a surface area in excess of 1,000 square meters per gram, and passing through a 325 mesh screen. The sodium bicarbonate is of food grade, sized leaving 28% on a 325 mesh screen. Curing is as in Example 1. The resulting pellet contains about 10% by weight of moisture. The pellets are screened to 4.times.6 mesh for testing.

#### Detailed Description Text - DETX:

The testing is carried out in a continuous flow system in which the test columns consist of 1.02 inch diameter glass tubes, charged to a bed height of 3

inches. Water containing chlorine in solution is passed through each sample bed. Chlorine is removed from the solution.

Current US Cross Reference Classification - CCXR:

95/132